Patent Claims

1. A universal joint system (1) for use in cardan shafts, in particular heavy duty cardan shafts;

1.1 having a journal cross (4), which is mounted in two joint yokes (2, 3) situated offset by 90° to one another;

1.2 each joint yoke (2, 3) comprises two joint yoke parts (9.1, 9.2, 10.1, 10.2);

1.3 each joint yoke part (9.1, 9.2, 10.1, 10.2) comprises a base part (11.1, 11.2, 12.1, 12.2) and a bearing part (13.1, 13.2, 14.1, 14.2) for mounting the journals (5.1, 5.2, 6.1, 6.2) of a journal cross (4);

1.4 each individual face part (11.1, 11.2, 12.1, 12.2) carries, on the front side (21, 22) pointing away from the bearing part (13.1, 13.2, 14.1, 14.2), means for coupling with complementary means in the form of driver element (26.1, 26.2) on the attachment element;

1.5 the joint yoke parts (9.1, 9.2, 10.1, 10.2) have, in the area of their base parts (11.1, 11.2, 12.1, 12.2), coupling areas (17, 18) forming coupling faces (29.11, 29.12, 29.21, 29.22, 30.11, 30.12, 30.21, 30.22, 31.1, 31.2, 32.1, 32.2) which are connectable to one another in a formfitting way, the coupling areas (17, 18) being characterized by a plane which is oriented perpendicular to the plane spanned by the driver elements (26.1, 26.2);

1.6 the base parts. (11. 1, 11.2, 12.1, 12.2) of the joint yoke parts (9.1, 9.2, 10.1, 10.2) have, on their coupling face (29.11, 29.12, 29.21, 29.22, 30.11, 30.12, 30.21, 30.22, 31.1, 31.2, 32.1, 32.2) pointing toward the base part (11.1, 11.2, 12.1, 12.2) of the particular other joint yoke part (10.1, 10.2, 9.1, 9.2), first teeth (33.11, 33.12, 33.21, 33.22, 34.11, 34.12, 34.21, 34.22) which are complementary to one another;

1.7 the extensions of at least one flank line (F_L) characterizing the first teeth (33.11, 33.12, 33.21, 33.22, 34.11, 34.12, 34.21, 34.22) on the coupling face or, with spiral teeth, the extension of the secants through the endpoints of the flank line (F_L) form an angle of $> 0°$ to $< 180°$ with a plane which is formed by the journal

axis (7) of the journal (5.1, 5.2) mounted in a joint yoke part (9.1, 9.2, 10.1, 10.2) and a joint yoke axis (G) coincident with an axis of rotation of the joint yoke (2, 3);

1.8 having further second teeth (35.1, 35.2) implemented on each of the coupling faces pointing toward one another in the area of the joint yoke axis (G);

1.9 the extensions of the flank lines of the second teeth (35.1, 35.2) describing the orientation of the teeth or, with implementation as spiral teeth, the extension of a secant through the endpoints of a flank line (F_L) of the second teeth (35.1, 35.2) are situated at an angle between 70° and 110°, inclusive, to the extension of a flank line of the first teeth (33.11, 33.12, 33.21, 33.22, 34.11, 34.12, 34.21, 34.22) or, with spiral teeth, to the extension of a secant through the endpoints of a flank line (F_L) of the first teeth (33.11, 33.12, 33.21, 33.22, 34.11, 34.12, 34.21, 34.22);

1.10 the individual base part (9.1, 9.2, 10.1, 10.2) is implemented as an integral flange and adjoins the bearing part (11.1, 11.2, 12.1, 12.2) without steps;

1.11 the journal cross (4) comprises two journals systems situated 90° offset to one another made of two journals (5.1, 5.2, 6.1, 6.2) situated 180° offset to one another and situated on a shared axis, which are situated in planes parallel to one another;

1.12 each individual bearing part (13.1, 13.2, 14.1, 14.2) for receiving the journals (5.1, 5.2, 6.1, 6.2) is implemented having a blind bore (15.1, 15.2, 16.1, 16.2);

1.13 the joint yoke parts of a joint yoke are connected to one another in the area of the base part (11.1, 11.2, 12.1, 12.2) via connection elements, the connection elements extending through the base part in the area of the center of gravity of the second teeth.

2. The universal joint system (1) according to Claim 1, characterized in that the individual coupling faces (29.11, 29.12, 29.21, 29.22, 30.11, 30.12, 30.21, 30.22, 31.1, 31.2, 32.1, 32.2), carrying the first (33.11, 33.12, 33.21, 33.22, 34.11, 34.12, 34.21, 34.22) and second teeth (35.1, 35.2, 36.1, 36.2), of each joint yoke part (9.1, 9.2, 10.1, 10.2) are situated in one plane.

3. The universal joint system (1) according to Claim 1, characterized in that the individual coupling faces (29.11, 29.12, 29.21, 29.22, 30.11, 30.12, 30.21, 30.22, 31.1, 31.2, 32.1, 32.2) for the first (33.11, 33.12, 33.21, 33.22, 34.11, 34.12, 34.21, 34.22) and second teeth (35.1, 35.2, 36.1, 36.2) of each joint yoke part (9.1, 9.2, 10.1, 10.2) are situated in different planes.

4. The universal joint system (1) according to one of Claims 1 through 3, characterized in that the extension of the flank lines (F_L) of the first teeth (33.11, 33.12, 33.21, 33.22, 34.11, 34.12, 34.21, 34.22) or, with spiral teeth, the secant through the endpoints of the flank line (F_L) run perpendicular to a plane which is characterized by the journal axis (7, 8) of the journal (5.1, 5.2, 6.1, 6.2) mounted in the joint yoke (2, 3) and a joint yoke axis (G) coincident with an axis of rotation of the joint yoke (2, 3).

5. The universal joint system (1) according to one of Claims 1 through 4, characterized in that, on the front side (23.1, 23.2, 24.1, 24.2) of the base part (11.1, 11.2, 12.1, 12.2) pointing away from the bearing part (13.1, 13.2, 14.1, 14.2), means (25.1, 25.2, 26.1, 26.2, 27.1, 27.2, 28.1, 28.2) are provided for coupling with complementary means on an attachment element for torque transmission to the attachment element and for centering attachment element and base part (11.1, 11.2, 12.1, 12.2) to avoid a relative movement in a plane which characterizes the coupling area between joint yoke part (9.1, 9.2, 10.1, 10.2) and attachment element and is oriented perpendicular to the plane which is formed by the journal axis (7, 8) of the journal (5.1, 5.2, 6.1, 6.2) mounted in the joint yoke part (9.1, 9.2, 10.1, 10.2) and the joint yoke axis (G) coincident with the axis of rotation of the joint yoke (2, 3).

6. The universal joint system (1) according to Claim 5, characterized in that the means (25.1, 25.2, 26.1, 26.2, 27.1, 27.2, 28.1, 28.2) comprise at least one axially oriented front teeth or front serrations implemented in at least segments over the entire circumference on the front side (23.1, 23.2, 24.1, 24.2) of the base part

(11.1, 11.2, 12.1, 12.2) facing away from the bearing part (13.1, 13.2, 14.1, 14.2) and running in the radial direction.

7. The universal joint system (1) according to one of Claims 5 or 6, characterized in that the means (25.1, 25.2, 26.1, 26.2, 27.1, 27.2, 28.1, 28.2) for coupling with complementary means on an attachment element (25) comprise blind bores (28.1, 28.2), carrying threads, on the base part (11.1, 11.2, 12.1, 12.2), which are oriented parallel to the joint axis (G).

8. The universal joint system (1) according to one of Claims 1 through 7, characterized in that the extension of the flank lines (F_L) of the second teeth (31.1, 31.2, 32.1, 32.2) or, with spiral teeth, the secant through the endpoints of a flank line of the second teeth (31.1, 31.2, 32.1, 32.2) runs parallel to the joint yoke axis (G).

9. The universal joint system (1) according to one of Claims 1 through 8, characterized in that a spacing of specific size, which is formed by a surface area implemented free of teeth, is provided in each case between the second teeth (31.1, 31.2, 32.1, 32.2) and the first teeth (33.11, 33.12, 33.21, 33.22, 34.11, 34.12, 34.21, 34.22) on the front side (37.1, 37.2, 38.1, 38.2).

10. The universal joint system (1) according to one of Claims 1 through 9, characterized by the following features:

10.1 the second teeth (31.1, 31.2, 32.1, 32.2) on each joint yoke part (9.1, 9.2, 10.1, 10.2) comprise two sets of partial teeth - first partial teeth and second partial teeth;

10.2 the two sets of partial teeth are situated at a distance from the joint yoke axis (G).

11. The universal joint system (1) according to one of Claims 1 through 10, characterized in that the axial offset of the individual journal axes of the journal

system (5.1, 5.2, 6.1, 6.2) of the journal cross (4) mounted in a joint yoke are in a range of Rota/5 to Rota/7, inclusive, Rota characterizing the rotational diameter.